

cubic curves by a novel method, but not many new theorems are the result; and Mr. E. W. Davis gives an expression for the co-ordinates of a point on a binodal quartic curve as rational functions of the elliptic functions of a variable parameter.

The only purely geometrical article is one by Mr. B. Alvord, entitled "The Intersection of Circles and the Intersection of Spheres." The problems discussed are to draw a circle which shall make a given angle with three given circles; to draw a sphere which shall cut each of four given spheres at a given angle; and then two Steinerian problems, viz. to draw a circle which shall cut four given circles at the same angle (angle unknown), and the analogous problem for five spheres. The number of solutions in each case is given, and there are four plates containing thirteen figures. Prof. C. H. Smith supplies a graphic method of solving spherical triangles.

There is a single astronomical article on certain possible abbreviations in the computation of the long-period inequalities of the moon's motion due to the direct action of the planets, by Mr. G. W. Hill, who states that Hansen has characterised the calculation of the coefficients of these inequalities as extremely difficult, but he himself thinks that, if the shortest methods are followed, there is no ground for such an assertion.

Prof. Turazza gives a note (which the editor had mislaid for three years), "Di un nuovo teorema relativo alla rotazione di un corpo ad un asse."

The only physical paper is Prof. Rowland's, "On the Propagation of an Arbitrary Electro-magnetic Disturbance on Spherical Waves of Light and the Dynamical Theory of Diffraction." The classical paper by Stokes "On the Dynamical Theory of Diffraction" is discussed; in addition the author treats of the general problem of spherical waves of light, which he has not seen considered anywhere else.

We think the titles of the papers and a perusal of their contents quite bear out Mr. Glaisher's opinion, pronounced in his notice of the previous volumes (vol. xxvii. *ubi supra*), viz. that "the volumes represent a considerable amount of mathematical work, a fair proportion of which may have real influence on the advancement of the science." Some readers might like to have a more diversified bill of fare set before them, but no one can say that what is offered is not generally first class. The form of the *Journal* lends itself admirably to the important tables with which it has been enriched from its earliest days. We are glad to find this young work maintaining its early promise, and we wish for it even a higher success in the days to come.

A SYSTEM OF PSYCHOLOGY

A System of Psychology. By Daniel Greenleaf Thompson. 2 vols. (London: Longmans, 1884.)

PSYCHOLOGY, like other sciences, may be regarded as a pure science, or as a set of generalisations capable of application to practice, or as material for a philosophical construction. Mr. Thompson has treated it, for the most part, in the spirit of a scientific inquirer. He does not stop to make applications to practical questions, and although he is not without metaphysical views of his own, it is evident that he is inter-

ested in psychology more for its own sake than for the sake of its bearing on his theory of the universe. There is, therefore, no need to discuss here the questions in dispute between the empirical school to which Mr. Thompson belongs and its various critics. As he has treated psychology so much in the scientific spirit, we may confine ourselves to indicating the kind of work he has done in his own special line.

Some have denied that psychology is a science, on the ground that it does not make progress; but it is only necessary to compare Locke's "Essay" with any modern work in which the treatment is not altogether inadequate, in order to see that progress has been made both in accuracy of description and in refinement of analysis of psychological facts. The admiration that must be felt for what Locke was able to do only makes the comparison more conclusive so far as the establishment of the scientific character of psychology is concerned. In criticising any new book, then, we ought to ask whether the author has made any advance on his immediate predecessors. We ought, in fact, to apply to the particular author we are criticising the test of progress to which psychology as a whole may be submitted. Mr. Thompson's book will emerge successfully from an examination such as that which is here suggested. In dealing with many special questions he goes beyond the later English psychologists just as they themselves have gone beyond Locke.

A student might very well begin with the sixth part of Mr. Thompson's book, entitled "The General Development of States of Consciousness," in order to get at the author's more important results, and then read the parts that come before it to understand more fully his general view of his subject, and the parts that come after it for new details. In this division of his work, the author brings out very clearly the difference between "presentative" and "representative" states of consciousness, and shows the influence of this difference in the spheres of feeling and of will, as well as of cognition. Emotional states are classified according to their relation to the environment, which may take the form of "pleasurable interest in external objects" or of "aversion to external objects." The chapter on "volitional development" (the first of the second volume) deserves the special attention of the psychological student. Mr. Thompson's introduction into the view he gives of the external world in its relation to mind (in Part III.), of a sort of Cartesian conception of "matter" as including "space," must be at least alluded to as likely to be found interesting both by physicists and metaphysicians. Although philosophy and science are now too much specialised for an idea of this kind to have any direct influence on research, yet all discussion between philosophers and men of science of the more general terminology of the sciences, and especially of physics, must have some effect in compelling clear definition of terms on the part of physicists and at the same time in keeping philosophic thought in contact with its basis of scientific law.

Mr. Thompson might perhaps have given a better account of the introspective method in psychology if he had had fuller possession of the idea of mind as something common to all individuals; if he had been able to show more clearly that it is not simply the individual

mind, but rather the general human mind, that the psychologist analyses. His omission to make it clear that psychology is really the science of human nature, and not a mere description of the mental states of an individual, or of as many individuals as possible, does not, however, destroy the value of his results. When he describes the science of psychology as being a sort of resultant of the contributions of various people who "chronicle their states," this is only an imperfect description of the method of psychology and of what it implies. To state the case in this way is to lose sight of the fact that society is an organism, and to consider it as an aggregate of isolated individuals; but, without any elaborate analysis, we may show that the introspective method of Mr. Thompson and of the older psychologists really implies more than the examination of any number of individual minds merely as such.

There is probably quite as much minute observation of mental states to be found in literature with no scientific pretensions,—in novels and autobiographies, for example,—as in books of psychology. Why has this kind of "introspection" first of all a literary, and only secondarily a scientific, interest? Is it not because the states of mind described are regarded as states of a particular mind, because they are merely elements in the description of some one personality, because they have no distinct reference to a law of mind in general? Of course some things in books of psychology have only a personal interest, and some things in books of pure literature may have a scientific interest; but there is no difficulty in distinguishing the two kinds of "introspection" when we meet with them, or in recognising them as essentially different.

The scientific character of the introspective method as being one that yields general conclusions is quite evident in Mr. Thompson's book, in spite of his omission definitely to point out this character. It has already been said that his "System of Psychology" furnishes new evidence of the progressive character of psychological studies. We may conclude by saying that, although in some respects an unequal book, it is decidedly an important contribution of America to the treatment of psychology on the lines with which English readers are most familiar.

OUR BOOK SHELF

The Student's Flora of the British Islands. By Sir J. D. Hooker, K.C.B., &c., &c. Third Edition. (London: Macmillan and Co., 1884.)

THE lover and collector of our wild plants may congratulate himself on the number of botanists of the first rank who have devoted their energies to his service. Benthams, Hooker, and Babington have all of them written hand-books of the British flora, all of them excellent in their way. In the one now before us we have the well-known lucidity of description characteristic of the author combined with the most recent extensions of our knowledge as regards British plants. Very great care and labour have been expended in bringing the "Student's Flora" abreast of the most recent discoveries. The number of species of flowering-plants added to the British flora since the publication of the last edition in 1878 is not inconsiderable, indeed is surprising, considering the limited extent of the field and the number of workers on it. In addition

to the introduction of these new species, the limits of species and sub-species have been carefully revised, and the "critical" genera submitted to the criticism of experts; the genus *Potamogeton* having been, in particular, revised by Mr. Arthur Bennett. Nor has the physiological side of the subject been neglected. For the first time, as far as I am aware, in any local flora of importance, the characters of the genera concerned in the process of fertilisation are given, especially those illustrated by the writings of the late Hermann Müller. Under the diagnosis of each genus it is stated—as far as is known—whether the plants belonging to it are wind-fertilised, insect-fertilised, or self-fertilised; whether honey is secreted in the flower or not; and whether the stamens and stigma ripen together, or, if not, which is the earlier. The result is that the field-student has now a hand-book of the characters of the plants that he meets with in wood and field, by stream and bog, and on the mountain-side, more complete than any which has heretofore been ready to his hand.

A. W. B.

Elementary Text-Book of Zoology. General Part and Special Part, Protozoa to Insecta. By Dr. C. Claus. Translated and edited by Adam Sedgwick, M.A., Fellow and Lecturer of Trinity College, Cambridge, with the assistance of F. G. Heathcote, B.A., Trinity College, Cambridge. (London: W. Swan Sonnenschein and Co., 1884.)

PROF. CLAUS'S "Elementary Text-Book of Zoology" has long been known as an excellent introduction to this branch of biology, and there was a certain charm in the way in which the introductory chapters, constituting the "General Part" of the work were written, that marked out the "*Lehrbuch der Zoologie*" as something different from many of the text-books that had preceded it. Its well-merited success in parts of the Continent where German is spoken is a matter of congratulation, and Mr. Sedgwick has translated it "with a view of supplying the want which," he tells us, "has long been felt by teachers as well as students in this country, of a good elementary text-book of zoology." It appears to us a pity that with this local demand for a good introduction to zoology, there should be apparently no other way of supplying it than by translating the works of our illustrious neighbours. It is certainly not the way that the schools of the great Continental centres are supplied, nor do we believe that it is from any want of original power to supply the need among our own zoologists. This view of the subject apart, the English student of zoology will find this translation of Claus's "*Lehrbuch*" a very excellent introduction. It is true that he may now and then note that it was not written for him, that the illustrations of specific forms referred to are not always, even when they might have been, within his easy reach; that some of the contributions of his countrymen are referred to as if they had first appeared in a foreign tongue, and that many very important ones are overlooked, but these will be scarcely difficulties in his way; and if they are, on application to an intelligent teacher they will be soon got over.

The original German has, with a few "unimportant exceptions, been closely followed throughout," but has it not been too closely adhered to, when it has been left altogether untranslated, as it apparently has been in the case of many very familiar families of insects? In some of these, too, the English equivalents are not perhaps of the best; thus *Acanthiade* (skin-bugs). In welcoming this attempt to introduce Prof. Claus's most useful work to the English reader we have no wish in any way to criticise the treatise in detail. It is got up in a very creditable manner, though a little more uniformity in the style of printing the technical words would have been desirable; thus, on the same page we find the words "*Cirripedia*" and "*Malacostraca*" in roman and in italic type, and specific names are not italicised in all cases,